

grade of observers in the Weather Bureau. Those who pass the examination for assistants will, of course, be also eligible as observers, and their promotion to higher grades will follow in due course.

The steady progress of meteorology and the increasing scope of the work of the Weather Bureau justify a demand for the services of the best class of men. Inasmuch as the highest professorships must be filled by steady promotion from the lower ranks, and as they presuppose a wide range of knowledge in physics and mathematics, languages and meteorology, it is evident that the young men who enter the service of the Weather Bureau must show acquirements that give promise of future study and progress and, consequently, eminence.

It is not to be denied that many who would naturally have made meteorology their life work, failed to do so because in early life no stimulus by way of instruction in this line of study was available. At the present time, however, this need can easily be supplied, since many high schools are introducing physics and meteorology into their courses of instruction, and the colleges will, undoubtedly, introduce it into their curricula as soon as the funds are provided to satisfy the increasing demand.

It is, however, a grave question whether in the present condition of affairs it would not be well to have at Washington a central school for both elementary and advanced courses of instruction in physics, mathematics, climatology, meteorology, and modern languages. This would relieve observers in charge of stations of the necessity of training inexperienced men in their duties, and secure both greater uniformity and higher standards in the attainments of the Weather Bureau observers. If a four-years' course is necessary for the preliminary education of a second lieutenant in the Army and the ensigns in the Navy, still more must this be true of the men who are to do the weather forecasting, river and flood predictions, and cognate scientific problems of the highest complexity that are pressing upon us for solution. The general organization of the Weather Bureau, like that of all Government offices, looks to the accomplishment of a great amount of very useful daily work, but, in addition to this, there is a demand for the solution of difficult problems in science as a prelude to still wider and more important daily work. Such solutions are not likely to be forthcoming until we have evolved men who have the genius and the training necessary for original research. Our standard of scientific efficiency must be raised higher.

RHODE ISLAND WEATHER.

Mr. William Foster, Jr., of Warwick, R. I., writes:

In my younger days I was a pretty close watcher of weather phenomena. * * * On several occasions I suggested in the public papers that the Government should institute definite observations throughout the country for obtaining the necessary data to determine the laws of storms. Though this has now been done the end is not yet. There are influences coming in which seem to block the general trend of the ordinary conditions. Hence, forecasts sometimes fail and the Weather Bureau gets a scoring. Early this season I removed from Providence to Warwick * * * and have become satisfied that some of our conditions here are abnormal. In July, August, and September, I noticed that the smoke from the locomotives passing in front of the station presented a peculiar appearance not readily mingling with the atmosphere. I also noticed that there is a prevalent haze, but this has passed away since early in November. Has this been observed elsewhere?

ST. ELMO'S FIRE.

Mr. E. P. Alexander, from Georgetown, S. C., communicates the following interesting item:

In August, 1885, I was traveling from Shoshone Falls, Idaho, to the Union Pacific Railroad about dark of a cloudy afternoon. The country is uneven tableland of volcanic formation, moderately covered with sage brush and a raw wind of about 8 miles per hour faced us. As darkness approached, from a rear seat I saw a faint streak of light on the frayed end of a stout switch with which our driver drove his tired mules. I vaguely thought that the sun must be still above the horizon and shining horizontally through a very fine slit in the clouds, so as to catch the end of the switch 3 feet above the level of my eye, but not observable by me. But in about three minutes the driver struck the mule again, and again there was a streak of light illuminating the top of his switch as it was raised in the air. I borrowed his switch and raised it over my head and about 3 feet above, the end of it glowed with something like St. Elmo's fire. It was sharply extinguished when held just below that level, and as sharply ignited when raised into or above it. The phenomenon was repeated as often as we tested for it until we reached our destination, the nearest station to Shoshone Falls. My idea at the time was that the friction of the breeze on the resinous foliage of the sage brush had in some way caused the existence of an electrified current about 8 feet above the earth, such as that which causes the St. Elmo's lights at sea.

BALL LIGHTNING.

The following letter from Mr. Edward M. Boggs, civil and hydraulic engineer, at Los Angeles, Cal., seems to corroborate the suggestion of the Editor on page 358 of the August REVIEW. If our explanation is correct, then similar phenomena should be frequently observable by the employees on our railroad trains. Will not some one inquire of them?

Referring to the supposed "ball" lightning described by Mr. C. N. Crotzburg on page 358 of the August REVIEW, I beg to offer the following as a plausible explanation of the phenomenon:

The appearance and the movements of the luminous body were such as might be caused by the reflection of some strong light, carried on the train, from a close succession of raindrops depending from a telegraph wire. Perhaps the strong red glare from the locomotive fire box was the origin of the light. The undulations of the telegraph line would change the height of the object, cause its observed oscillating motion, and would account for the seeming change in horizontal distance and the occasional disappearances, while the varying angle of reflection, due to curves in the road, would cause the light to gain or lose in distance alongside the train.

Mr. T. P. Yates, voluntary observer at Waverly, N. Y., writes, under date of November 12, as follows:

I was much interested in your "ball lightning" article in the August REVIEW, but disappointed at there being no more data. I now give you a narrative related to me by Morris Barton some years ago, who saw it at the time he lived near Danby [Danbury?], in Connecticut:

"I was standing in a barn boor, facing a farmhouse, during a passing thunder shower, in the daytime, when my attention was taken by a ball of lightning moving toward the house. It entered the room through an open door, and passed out of an opening on the other side into the open air and out of my sight, and directly after there was a loud explosion as the ball encountered an apple tree beyond, which shattered the ball to pieces."

Further questioning only elicited the facts that "a woman who was doing some housework in the room was greatly frightened;" that he "drew a breath of relief when it passed out on the other side;" that "it was as big as a pumpkin and of a deeper color;" and that "it floated and bobbed leisurely along until it hit the tree." I have no doubt he gave a correct account as it appeared to him. This is the most authentic account by an eye witness that I have come across. Nothing of the kind has yet come before my vision.

The exact date of the above occurrence can not now be stated, but it was over twenty-five years ago. Possibly some one now living in Danbury, Conn., may be able to send it to the Editor.

CLOUD PHENOMENA AT SUNRISE AND SUNSET.

Mr. S. L. Brooks, voluntary observer, The Dalles, Oreg., forwards two beautiful photographs showing streaks of light illuminating the under surface of a layer of alto-stratus cloud just before sunrise of December 2. The illuminated cloud resembles the tail of a comet reaching from the horizon far up to the northeast over an arc of nearly 90°. After 8:15